



USSN 10/803,526  
Attorney Docket No. 2003-0125-01

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Stephanie Sharrett

(Typed or Printed Name of Person mailing papers or fees)

(Signature of Person mailing papers or fees)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Robert P. Akins, et al.

Serial No.: 10/803,526

Filing Date: March 17, 2004

Title: A HIGH REPETITION RATE LASER  
PRODUCED PLASMA EUV LIGHT  
SOURCE

Examiner: Unassigned

Group Art Unit: Unassigned

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 C.F.R. § 1.97 and § 1.98, applicants submit for consideration in the above-identified application the attached Form PTO-1449. The Information Disclosure Statement submitted herewith is being filed before the mailing date of the first Office Action on the merits. Copies of the cited references are not provided pursuant to the USPTO waiving the requirement of submitting patent copies for applications filed after June 30, 2003, however Items AF through BP are provided herewith.

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form PTO-1449 with initials or other appropriate marks.

This Information Disclosure Statement under 37 C.F.R. § 1.97 is not to be construed as a representation that: (i) a complete search has been made; (ii) additional information material to the examination of this application does not exist; (iii) the information, protocols, results and the like reported by third parties are accurate or enabling; or (iv) the above information constitutes prior art to the subject invention.

Accordingly, no fee is believed to be due. The Commissioner is hereby authorized to charge any fees, or to credit any overpayment to Deposit Account No. 03-4060.

Respectfully submitted,



William Cray, Reg. No. 27,627

April 26, 2004  
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U.S. Department of Commerce, Patent and Trademark Office		Atty Docket No.	Serial No.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT		Applicant(s)	
(Use several sheets if necessary)		Robert P. Akins, et al.	
		Filing Date	Group
		March 17, 2004	Unassigned

## U.S. Patent Documents

*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
	A	2,759,106	8/14/56	Hans Wolter	250	53	
	B	3,150,483	5/10/62	Mayfield, et al.	60	35.5	
	C	3,232,046	2/1/66	Rudolf Meyer	50	35.5	
	D	3,279,176	10/18/66	Robert H. Boden	60	202	
	E	3,746,870	7/17/73	Donald M. Demarest	250	227	
	F	3,960,473	6/1/76	Thomas Harris	425	467	
	G	3,961,197	6/1/76	John M. Dawson	250	493	
	H	3,969,628	7/13/76	Roberts, et al.	250	402	
	I	4,042,848	8/16/77	Ja Hyun Lee	313	231.6	
	J	4,088,966	5/9/78	Michael A. Samis	313	231.5	
	K	4,143,275	3/6/79	Mallozzi, et al.	250	503	
	L	4,162,160	7/24/79	Gerald J. Witter	75	246	
	M	4,203,393	5/20/80	Dante S. Giardini	123	30	
-----	N	4,504,964	3/12/85	Cartz, et al.	378	119	
	O	4,536,884	8/20/85	Weiss, et al.	378	119	
	P	4,538,291	8/27/85	Seiichi Iwamatsu	378	119	
	Q	4,596,030	6/17/86	Herziger, et al.	378	119	
	R	4,618,971	10/21/86	Weiss, et al.	378	34	
	S	4,626,193	12/2/86	Ronald A. Gann	431	71	
	T	4,633,492	12/30/86	Weiss, et al.	378	119	
	U	4,635,282	1/6/87	Okada, et al.	378	34	

## Foreign Patent Documents

							Translation	
		Document	Date	Country	Class	Subclass	Yes	No

## OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)

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Examiner

Date Considered

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	V	4,751,723	6/14/88	Gupta, et al.	378	119	
	W	4,752,946	6/21/88	Gupta, et al.	378	119	
	X	4,837,794	6/6/89	Riordan, et al.	378	119	
	Y	5,023,897	6/11/91	Neff, et al.	378	122	
	Z	5,027,076	6/25/91	Horsley, et al.	324	674	
	AA	5,102,776	4/7/92	Hammer et al.	430	311	
	BB	5,126,638	6/30/92	Rolf Dethlefsen	315	326	
	CC	5,142,166	8/25/92	Daniel L. Birx	307	419	
	CC	5,313,481	5/17/94	Cook et al.	372	37	
	DD	5,411,224	5/2/95	Dearman, et al.	244	53	
	EE	5,448,580	9/5/95	Birx et al.	372	38	
	FF	5,504,795	4/2/96	Malcolm McGeoch	378	119	
	GG	5,729,562	3/17/98	Birx et al.	372	38	
	HH	5,763,930	6/9/98	William N. Partlo	250	504	
	II	5,866,871	2/2/99	Daniel L. Birx	219	121	
	JJ	5,936,988	8/10/99	Partlo et al.	372	38	
	KK	5,963,616	10/5/99	Silfvast, et al.	378	122	
	LL	6,031,241	2/29/00	Silfvast, et al.	250	504	
	MM	6,039,850	3/21/00	Stephen C. Schulz	204	192.15	
	NN	6,172,324	1/9/01	Daniel L. Birx	219	121.57	

  

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	OO	6,051,841	4/18/00	William N. Partlo	250	504		
	PP	6,064,072	5/16/00	Partlo, et al.	250	504		
	QQ	6,195,272	2/27/01	Joseph E. Pascente	363	21		
	RR	6,452,199	9/7/02	Partlo, et al.	250	504		
	SS	6,566,667	5/20/03	Partlo, et al.	250	504		
	TT	6,566,668	5/20/03	Rauch, et al.	250	504		
	UU	6,576,912	6/10/03	Visser, et al.	250	492.2		
	VV	6,586,757	7/1/03	Melnichuk, et al.	250	504		
	WW	2001/0055364	12/27/01	Kandaka, et al.	378	119		
	XX	2002/0100882	8/1/02	Partlo, et al.	250	504		
	AA	2002/0163313	1/9/03	Ness, et al.	315	111.01		
	AB	2002/0168049	11/14/02	Schriever, et al.	378	119		
	AC	2003/0006383	1/9/03	Melnichuk, et al.	250	504		
	AD	2003/0068012	4/10/03	Ahmad, et al	378	119		
	AE	2003/0219056	11/27/03	Yager, et al.	372	57		
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OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
	AF	Andreev, et al., "Enhancement of laser/EUV conversion by shaped laser pulse interacting with Li-contained targets for EUV lithography". <u>Proc. Of SPIE</u> . 5196:128-136. (2004)						
	AG	Apruzese, J.P., "X-Ray Laser Research Using Z Pinches," <u>Am. Inst. of Phys.</u> 399-403, (1994).						
	AH	Bollanti, et al., "Compact Three Electrodes Excimer Laser IANUS for a POPA Optical System," <u>SPIE Proc.</u> (2206)144-153, (1994).						
	AI	Bollanti, et al., "Ianus, the three-electrode excimer laser," <u>App. Phys. B (Lasers &amp; Optics)</u> 66(4):401-406, (1998).						
	AJ	Choi, et al., "A 10 <sup>13</sup> A/s High Energy Density Micro Discharge Radiation Source," <u>B. Radiation Characteristics</u> , p. 287-290.						
	AK	Choi, et al., "Fast pulsed hollow cathode capillary discharge device," <u>Rev. of Sci. Instrum.</u> 69(9):3118-3122 (1998).						
	AL	Fomenkov, et al., "Characterization of a 13.5nm Source for EUV Lithography based on a Dense Plasma Focus and Lithium Emission." <u>Sematech Intl. Workshop on EUV Lithography</u> (Oct. 1999).						
	AM	Hansson, et al., "Xenon liquid jet laser-plasma source for EUV lithography," <u>Emerging Lithographic Technologies IV, Proc. Of SPIE</u> , Vol. 3997:729-732 (2000).						
	AN	Kato, Yasuo, "Electrode Lifetimes in a Plasma Focus Soft X-Ray Source," <u>J. Appl. Phys.</u> (33) Pt. 1, No. 8:4742-4744 (1991).						
	AO	Kato, et al., "Plasma focus x-ray source for lithography," <u>Am. Vac. Sci. Tech. B.</u> 6(1): 195-198 (1988).						
	AP	Lebert, et al., "Soft x-ray emission of laser-produced plasmas using a low-debris cryogenic nitrogen target," <u>J. App. Phvs.</u> 84(6):3419-3421 (1998).						
	AQ	Lebert, et al., "A gas discharge based radiation source for EUV-lithography," <u>Intl. Conf. Micro and Nano-Engineering 98</u> (Sept. 22-24, 1998) Leuven, Belgium.						
	AR	Lebert, et al., "Investigation of pinch plasmas with plasma parameters promising ASE," <u>Inst. Phys. Conf. Ser No. 125: Section 9</u> , pp. 411-415 (1992) Schiersee, Germany.						
	AS	Lebert, et al., "Comparison of laser produced and gas discharge based EUV sources for different applications," <u>Intl. Conf. Micro- and Nano-Engineering 98</u> (Sept. 22-24, 1998) Leuven, Belgium.						
	AT	Lee, Ja H., "Production of dense plasmas in hypocylodial pinch apparatus," <u>The Phys. Of Fluids</u> , 20(2):313-321 (1977)						
	AU	Lewis, Ciaran L.S., "Status of Collision-Pumped X-ray Lasers," <u>Am Inst. Phys. Pp.</u> 9-16 (1994).						
	AV	Malmqvist, et al., "Liquid-jet target for laser-plasma soft x-ray generation," <u>Am. Inst. Phys.</u> 67(12):4150-4153 (1996)						
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OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)									
	AW	Mather, et al., "Stability of the Dense Plasma Focus," <u>Phys. Of Fluids</u> , 12(11):2343-2347 (1969).							
	AX	Mayo, et al., "A magnetized coaxial source facility for the generation of energetic plasma flows," <u>Sci. Technol.</u> Vol. 4:pp.47-55 (1994).							
	AY	Mayo, et al., "Initial Results on high enthalpy plasma generation in a magnetized coaxial source," <u>Fusion Tech</u> Vol. 26:1221-1225 (1994).							
	AZ	Nilsen, et al., "Analysis of resonantly photopumped Na-Ne x-ray-laser scheme," <u>Am Phys. Soc.</u> 44(7):4591-4597 (1991).							
	BA	Orme, et al., "Electrostatic charging and deflection of nonconventional droplet streams formed from capillary stream breakup," <u>Physics of Fluids</u> , 12(9):2224-2235, (September 2000).							
	BB	Orme, et al., "Charged Molten Metal Droplet Deposition As a Direct Write Technology", MRS 2000 Spring Meeting. San Francisco. (April 2000).							
	BC	Pant, et al., "Behavior of expanding laser produced plasma in a magnetic field," <u>Physica Scripta</u> , T75:104-111, (1998).							
	BD	Partlo, et al., "EUV (13.5nm) Light Generation Using a Dense Plasma Focus Device," <u>SPIE Proc. On Emerging Lithographic Technologies III</u> . Vol. 3676. 846-858 (March 1999).							
	BE	Porter, et al., "Demonstration of Population Inversion by Resonant Photopumping in a Neon Gas Cell Irradiated by a Sodium Z Pinch." <u>Phys. Rev. Let.</u> 68(6):796-799. (Feb. 1992).							
	BF	Price, Robert H., "X-Ray Microscopy using Grazing Incidence Reflection Optics," <u>Am. Inst. Phys.</u> , pp. 189-199, (1981).							
	BG	Qi, et al., "Fluorescence in Mg IX emission at 48.340 Å from Mg pinch plasmas photopumped by Al XI line radiation at 48.338 Å," <u>The Am. Phys. Soc.</u> , 47(3):2253-2263 (March 1993).							
	BH	Scheuer, et al., "A Magnetically-Nozzled, Quasi-Steady, Multimegawatt, Coaxial Plasma Thruster," <u>IEEE: Transactions on Plasma Science</u> , 22(6) (Dec. 1994).							
	BI	Schriever, et al., "Laser-produced lithium plasma as a narrow-band extended ultraviolet radiation source for photoelectron spectroscopy," <u>App. Optics</u> , 37(7):1243-1248. (Mar. 1998).							
	BJ	Schriever, et al., "Narrowband laser produced extreme ultraviolet sources adapted to silicon/molybdenum multilayer optics," <u>J. of App. Phys.</u> 83(9):4566-4571. (May 1998).							
	BK	Silfvast, et al., "High-power plasma discharge source at 13.5 nm and 11.4 nm for EUV lithography," <u>SPIE</u> , Vol. 3676:272-275. (Mar. 1999).							
	BL	Silfvast, et al., "Lithium hydride capillary discharge creates x-ray plasma at 13.5 nanometers," <u>Laser Focus World</u> , p. 13 (Mar. 1997).							
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OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)									
	BM	Tillmack, et al., "Magnetic Confinement of an Expanding Laser-Produced Plasma", UC San Diego, Center for Energy Research. UCSD Report & Abramova – Tornado Tran.							
	BN	Wilhein, et al., "A slit grating spectrograph for quantitative soft x-ray spectroscopy," Am. Inst. Of Phys. Rev. of Sci. Instrum., 70(3):1694-1699, (Mar. 1999).							
	BO	Wu, et al., "The vacuum Spark and Spherical Pinch X-ray/EUV Point Sources," SPIE, Conf. On Emerging Tech. III, Santa Clara, CA, Vol. 3676:410-420, (Mar. 1999)							
	BP	Zombeck, M.V., "Astrophysical Observations with High Resolution X-ray Telescope," Am. Inst. Of Phys., pp. 200-209, (1981).							
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